MARRIAGE FLIGHT AND COLONY FOUNDING OF THE COMMON BLACK ANT [*CAMPONOTUS* (*TANAEMYRMEX*) *COMPRESSUS* LATR.]

By

P. N. Krishna Ayyar.

(*Parasitologist, Agricultural College, Coimbatore*).

(*With 2 text-figures*).

Introduction.

One of the commonest and most abundant of South Indian ants, the Common Black Ant, *Camponotus compressus* Latr., has been the object of observation and study by the writer for some time now; and an account of the same has been presented in a paper published in the *Bulletin of Entomological Research,* London, 1935 (vol. 25). In that paper the writer recorded the location, structure and contents of their abodes, their population and life economy, seasonal occurrence, associations and their agricultural importance together with a few facts in their life history and habits. There are still some very interesting problems such as their marriage flights, colony founding, etc., which have not hitherto received sufficient attention. Wheeler, one of the foremost among Myrmecologists, says that 'the date and form of marriage flight in ants are really specific characters and are clearly adaptations to the ecological conditions'. The writer intends in this brief note, to call attention to some peculiarities in the marriage flights, colony founding, etc., of this common species based on some recent observations.

Previous Knowledge.

Information of a most varied and interesting nature concerning the species has been published by various naturalists, but no satisfactory description of mating habits and other related phenomena has yet been furnished. Hence the evidence available on the nature of the association of the sexes and the manner of colony founding is practically non-existent. Rothney (1889) was probably the first to call attention to this habit of *C. compressus*. He merely states, however, that the sexes swarm in May or early June and take flight as soon as the sun goes down. According to Wroughton (1892) the marriage flight takes place in June after the first monsoon showers, usually in the evenings or in the night. Hingston (1923) records that he observed a number of sexual forms flying about the lamps indicating a nuptial flight. The present writer (1935) has written that the marriage flights have been observed in the evenings between 6.30 and 9 p.m. as the winged sexual forms are crepuscular. Further observations have led the

writer to reconsider this question and revise his former statement in as much as he observed marriage flights occurring much earlier in the year, though the same might continue till June or even July.

Main features of the marriage flight of *C. compressus*.

The data on mating habits and colony founding are greatly needed to throw light on the nature of association of sexes. As seen from the brief review presented above, previous investigators have not recorded any satisfactory description of the nuptial flight or copulation of this species. It is generally known that the marriage flights usually occur within definite and limited periods in the year, and the main factors that awaken the several forms to seek union on emergence from the nest are probably meteorological conditions. For over three or four years the writer has been watching colonies located permanently in certain places in order to see the initial stages of emergence of winged forms. Hundreds of times has he vainly sought to find them in the act of copulation. Times without number the writer has taken sexual forms attracted to light between May and June and rarely in July. He has also collected winged sexual forms in small numbers at other times particularly in October after the rains.

It was only in April this year that the writer was fortunate enough in witnessing the actual processes of emergence and mating. During the cool, humid afternoon of the 1st April 1936 at about half past one, the writer, in the course of a stroll in the back-yard garden of his house came upon a swarm of these ants. Many of the ants of the colony were not, at that time, out of doors. The day was particularly cloudy and there was slight drizzling with no sunshine at all from daybreak. A summary of the weather conditions as recorded in the institute for the day is furnished below.

Pressure.	Dry Bulb.	Wet bulb.	Maxm.	Minm.	Humidity.	Rainfall.
29·808	73·8	71·8	87·0F	70·6F	90	0·65

The ground was very wet as there had been heavy rains the previous evening and night. A small contingent of *C. compressus* was observed issuing from a formicary through an aperture near a masonry structure on the ground. A few large soldiers were the first to emerge and initiate the exodus. These were closely followed by a winged virgin queen with a train of other soldiers, workers of various grades and winged males. Their march around their old homestead was conspicuous in various ways. The throng looked like an unorganised and disorderly mass of workers of varying grades interspersed with winged sexual forms. The occasion seemed to be an extraordinary one since the whole company of workers was seething with excitement. They were moving restlessly about, passing and repassing their comrades. The virgin winged queen was also slowly wandering about with a peculiar jerky gait. On a detailed examination, the swarm was found to consist of one large winged virgin queen with a long and bulky abdomen, 29 winged males and 78 workers made up of 40 large

soldiers, 20 workers major, 10 workers media and 8 workers minor. The winged queen evidently happened to be the centre of attraction and the rest appeared to recognise the 'sanctity' of their charge as displayed by their extreme alertness. The workers, particularly the soldiers, never strayed beyond a small radius round about in the vicinity of the sexual winged forms.

For about a couple of minutes after emergence the males seemed to be utterly oblivious to the presence of the queen. By this time the queen was surrounded by a group of three to four males. There was no recourse to any kind of courting. The males simply crowded round her and each in its own way clumsily attempted to mount on her back. The queen's reaction was to move about with a view to avoid these overtures. At last one persistent male succeeded in its attempt and mounted on her back with its legs encircling her body. The male's abdomen was raised, the abdominal tip being bent and lowered on to the larger abdomen of the female and the connection was so effected. There was no attempt at flight throughout the act. It demonstrates that mating can take place on the ground near the nest. The actual process of copulation lasted for nearly two to three minutes; the queen then slowly slipped out and separated herself from the grip of the male. Within a minute after copulation she shed her large gauzy wings and converted herself into a dealated queen.

Fig. 1.—Winged male of the Common Black Ant (*Camponotus compressus* Latr.)

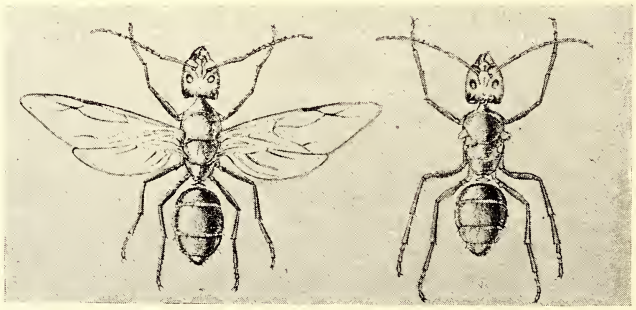

Fig. 2.—Queen. Common Black Ant (*C. compressus* Latr.) in virgin state and on shedding her wings after copulation.

The impregnated queen seemed to be taken extra care of by the workers. She was closely watched, followed and protected by the large soldiers. Attempts to capture the queen by the writer were greatly resented and were frustrated many times by the fierce fight put up by the excited and angry crowd. Every time, the ants rushed on the intruder furiously with open and outstretched mandibles, and inflicted severe bites, infusing the wound with a drop of formic acid from the abdominal extremity. Their watchfulness did not abate even after the queen had been imprisoned

in a specimen tube. The tube was wrapped in tissue paper and laid nearby while the writer was engaged in watching other colonies. The fury of the retinue was directed to the tube and the wrapping was torn off to some extent and every attempt to liberate the royal prisoner were made. They remained in this highly excited and angry mood for very nearly half an hour and then slowly departed into the nest. But for a considerable length of time afterwards they continued to emerge again and again probably in their endeavour to make a vain search for their lost queen.

Colony founding.

A careful search of other nests in the locality showed that sexual forms had also emerged simultaneously in a few others. The number of sexual forms and the proportion of workers seemed, from a few rough computation, to vary within a wide range. In one case, probably after terrestrial mating, the soldiers with unlocked mandibles seized the wings of the fecundated queen and pulled them off violently. They later on virtually dragged her back into the parental nest. Two dealated queens attended by a large retinue of workers were observed in one case. A few other dealated queens were seen, accompanied by groups of workers at some distance from original nests and these had disappeared probably by migrating in a body to adjacent situations to start perhaps fresh branch colonies. There was not a single case of flight by the winged sexual forms. But at night, on the same date, the writer was successful in collecting a few winged forms which were attracted to ordinary lights. Evidently there had been an actual marriage flight.

These observations afford an insight into some interesting habits of *C. compressus* in regard to mating and colony founding. Terrestrial mating may occur just outside the parental nest and can take place early in an afternoon provided the environmental conditions are favourable. The queen thus fecundated has the option of either returning to the old homestead or of starting, by short migrations, a fresh branch-nest probably aided by her retinue of workers. As is evidenced by real marriage flights after dusk the sexual forms of different colonies in the locality have chances of mating on the wing, in which cases the fecundated queen can start fresh colonies almost unaided. It may also be inferred from the presence of more than one dealated queen in a fresh colony that a few fecundated queens may co-operate in founding fresh colonies. Evidence on this last method may be adduced from the following observation on a caged queen kept in the laboratory.

Life history notes.

From one of the swarms found emerging on the 1st April 1936 a virgin winged queen after impregnation on the ground outside the nest was from that date kept isolated in a small glass jar in company with the lucky male and a few workers of various grades. These were kept without any supply of food or even water. The queen divested herself of her wings in a few minutes. On the

second day the male with the wings intact was found dead. The workers began to die one after another and by the tenth of the month there was no worker left alive. By this time the fecundated queen showed a slight distention of the gaster. Very little attention was paid to the cage because no supply of either food or water had to be made. On the 15th of the month the queen was found to have laid a first batch of five eggs. On the 16th eight more eggs were laid. These were carefully looked after by the queen mother; they were collected together, constantly licked and transported by her between her mandibles. On the 20th morning two of the eggs were noted to have hatched. The next day the two larvæ were observed to be of unequal size one being comparatively much larger than the other. The larvæ were also continuously fed on saliva, licked and groomed by the parent. On the 22nd of the month two more eggs hatched. The larger larva began cocooning between the smooth sides of the jar on the 24th. The other grub also commenced the process of spinning on the 27th. Meanwhile one or two more eggs had hatched. The cocooned specimens were very much undersized and these were carried by the mother to different parts of the jar. Though this time she attended to her own toilet, cleaning her antennae with her front legs and cleaning these in their turn by drawing them up between the maxillæ. By this time all the unhatched eggs and the small grubs were found missing having been consumed by the mother. On the 9th May 1936 a small worker adult was dragged out by the parent after cutting open the cocoon. It was yellowish white in colour to begin with, later on became brown and assumed the dark colour on the second day. The queen apparently looked healthy though languid and her bulk had gradually decreased. The queen eventually died on the 15th of the month and the other worker failed to emerge from the cocoon.

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